

Patient Handbook for Hyperbaric Therapy

Introduction

Welcome to the Davis Hyperbaric Laboratory at Brooks Air Force Base - the birthplace of modern Hyperbaric Medicine. This handout is designed to provide you with information concerning your scheduled hyperbaric oxygen (HBO) treatment. We hope it will answer any questions you have and give you a general idea of what to expect during your oxygen therapy.

Hyperbaric Medicine & Facility

The Hyperbaric Medicine Division is located in building 160-W at Brooks AFB, TX. This facility provides policy and expert guidance for the department of defense, education and consultation for military physicians and their patients, and HBO treatment if appropriate for referred patients. The Undersea and Hyperbaric Medicine Society has recognized HBO as effective therapy for 13 disorders. These indications include: osteomyelitis which doesn't respond adequately to standard treatment; certain non-healing skin ulcers; problem surgical wounds; skin grafts and flaps which may be in trouble. HBO is also the standard of care for patients who have received radiation to their head and neck, and are now facing additional head/neck/oral surgery.

Emergency conditions treated include: air or gas bubbles trapped in the blood stream (a possible surgical complication); carbon monoxide poisoning; decompression sickness; thermal burns; gas gangrene and other invasive skin infections; and crush injury or compartment syndrome.

What is Hyperbaric Therapy?

Hyperbaric oxygen is a medical treatment in which the patient breathes 100% oxygen while inside a chamber under pressure. This therapy is very helpful in the treatment of many medical and surgical problems. Except for the emergencies listed above, HBO is used as only one part of an overall treatment plan, including surgery, antibiotics, and other therapy.

How Does HBO Work?

Hyperbaric oxygen is 100% oxygen, delivered to your body, in a pressurized environment. The air we normally breathe is only 21% oxygen and 79% nitrogen, at a pressure of 14.7 pounds per square inch (psi). In hyperbaric treatments, the pressure is typically increased to 2.4 times normal (may be up to 6 times, depending on the case), and

the patient breathes 100% oxygen through a clear hood, or mask. In the case of our standard wound care treatment “dive” the patient receives 11 times the normal amount of oxygen compared to breathing air. This increases the amount of oxygen carried by the blood to all parts of the body. This also explains why simply placing a wounded area in an oxygen “tent” cannot be effective: the oxygen must be delivered to all parts of the body by the blood stream; otherwise it will simply be washed away from a single part by the blood stream! When properly applied to specific conditions, hyperbaric oxygen effectively helps promote healing and decreases infection. The following benefits may apply to your particular case:

- a) increased blood flow to injured tissue
- b) formation of new blood vessels
- c) reduced swelling
- d) helps fight infection
- e) enhanced wound healing
- f) increased new bone formation
- g) reduced effects of toxic substances

Oxygen delivered under pressure actually dissolves in your blood stream, and is carried in solution like the fizz in a capped soda bottle! This is much different than the normal method of carrying oxygen, in which your red blood cells transport oxygen like small coal cars floating in a stream. While small blockages may prevent the red cells from delivering oxygen to damaged tissues, oxygen dissolved in

the “stream” of your tissue fluids can reach those damaged areas and help fuel the healing process.

Treatment Goals

Treatment outcomes range from complete resolution of the medical problem, to no change, and every combination between. In about 80% of the cases, significant improvement or complete resolution of the problem is seen. This means that some patients may not respond to hyperbaric oxygen therapy. Since it can be very difficult to predict exactly who those patients might be, some treatments may be started when the outcome is not certain. Except in unusual circumstances, if no improvement is seen within 15 to 20 treatment dives, the likelihood of success is greatly diminished. A patient may be returned to their primary care provider in such cases to seek other treatment options.

After 20 to 30 dives where there is a good response, hyperbarics may be discontinued with the full expectation that the wound healing started by hyperbarics can now continue on its own due to the generation of new blood vessels. We may be able to provide post-hyperbaric wound care in selected cases where total healing is imminent. In those cases where a wound is not responsive to hyperbarics, or continues unimproved for several weeks, the pa-

tient will be returned to their primary care provider to investigate other treatment options.

Other treatment plans, such as for chronic refractory osteomyelitis, may require continued treatment for several weeks after it appears the problem has resolved on the surface!

Throughout your hyperbaric treatment period, you must remain in contact with your primary health care provider to keep them apprised of your situation, and to care for your other health needs. While our hyperbaric physicians are fully licensed doctors, their specialty remains in the provision of hyperbaric therapy. For issues unrelated to wound care and the capabilities of hyperbarics, your primary referring physician and his affiliated team of specialists must remain your primary source of care.

The Hyperbaric Chamber

The main hyperbaric chamber at Brooks is a large cylinder, 10 feet in diameter and 24 feet long! During a treatment dive, compressed air is added to the inside of the chamber until the pressure reaches about 2.4 times that found at sea level. This pressure is the same as that experienced by a scuba diver 45 feet under the surface of the ocean, and is why we refer to the treatment as a dive.

The chamber is equipped with an oxygen humidification delivery system for the treatment hoods, and can accommodate plain chairs, wheel chairs, and hospital gurneys. There are six glass port-holes for visual observation of the outside world - one of which contains a TV set! There is an intercom system to permit communications with the chamber operator, and a pass-through “lock” to permit delivery of food, medications, and supplies, should they be needed during a treatment. At the end of the dive, the extra air is slowly released from the chamber, returning the pressure to normal, and ending the dive.

Though snacks and beverages are available inside the chamber, bathroom facilities are limited to bedpans, urinals, and commode-chairs. Taking care of business before the dive is highly recommended.

Hyperbaric Chamber Staff

Our staff consists of specially trained physicians, nurses, technicians, and physiologists. We have all attended formal courses providing expertise in all aspects of hyperbaric medicine. While you are being treated in the chamber, there will always be a qualified attendant with you.

Transportation and Timing

If you are a hospital in-patient, the hospital staff will schedule transportation for you. Outpatients (not in the hospital) will need to make their own arrangements for transportation. You will be instructed when to arrive for wound care prior to the treatment dive, if applicable. If wound care is not required, you should arrive no less than 30 minutes prior to the scheduled dive to allow time to change into dive clothing and take care of other administrative tasks. Parking spaces have been reserved in our lot for outpatients who drive to the chamber. You will receive a HBO patient identification placard for display in your windshield when using these parking spaces.

Pretreatment Preparation

Preparation for hyperbaric therapy involves several concepts:

- a) You should not use any tobacco products while receiving hyperbaric oxygen therapy. Smoking prevents full oxygen transport by the blood, and also decreases blood vessel size.
- b) Ensure the hyperbaric physician knows about all of the medications you are taking, and if any of those medications are changed.

If you become ill (cold, sinus congestion, diarrhea, nausea, swollen feet, difficulty breathing, chest pains, low blood sugar, etc) during your weeks of HBO and have to cancel a treatment dive, please contact us as soon as possible (someone is in our facility by 0630). If the problem is serious, please have the treating physician contact us to discuss your progress and plans for returning to the chamber. If the illness is only mild, ensure you discuss it with one of our doctors before proceeding with your treatment that day.

If you are diabetic we will check your sugar level immediately before the dive because hyperbaric oxygen can increase the effect of insulin on lowering your blood sugar. Your sugar level should be 120 or above before entering the treatment chamber.

What Happens During A Typical ‘Dive’

Hyperbaric treatments themselves are painless, but do take time, and are pretty boring! You should bring something to do during your treatment such as reading or a small handicraft to help pass the time. We keep a good supply of magazines on hand. Newspapers may not be taken into the chamber as the ink becomes hazardous under pressure. At the beginning and the end of your treatment, you may feel a mild pressure in your ears while the chamber is being

pressurized or returning to sea level. Our personnel will work closely with you so that you become familiar with an effective way to equalize this pressure. The sensation is the same as you experience when flying in an airplane or space shuttle. If you can easily clear your ears in an aircraft, you should not have any difficulty in the chamber. If you do have difficulty, let the hyperbaric team know so that special precautions may be taken. On rare occasions someone may have recurrent difficulties getting to treatment depth. In those cases, a minor procedure will be performed at your main hospital, taking only a few minutes using local anesthetic, to place small ventilation tubes in the eardrum. Once this is done, there should be no further difficulties.

After dressing in our chamber clothes (handsome royal blue jump suits, or glistening Durette Gold), a rubber neck ring will be applied (fits like a turtleneck), and you will take your seat in the chamber. You are required to remain in your assigned seat during the dive so that the inside chamber attendant can properly monitor your progress. Once the door is closed, a safety checklist is completed, and the dive begins. You will notice the mild sensation of pressure in the ears, and the temperature will rise as the air is compressed. There is a noticeable rushing of air as the dive progresses, and ear muffs are available should you find the noise too loud. If you experience any difficulty clearing your ears, have sinus pain, nausea, or other problems, simply notify the inside attendant by raising your hand. He/she will request the chamber operator to stop the

descent, and will show you several methods to help you clear the problem. Although the chamber is air conditioned, during the descent (7 minutes) the air temperature typically reaches 89 - 90 degrees at 87% humidity! This rapidly returns to normal once the treatment depth of 45 feet is reached.

Because the oxygen you are breathing is a dry gas, humidity is added before it enters your breathing hood. If you find the breathing mixture too “heavy”, decreasing the humidity may help. If you find yourself “drying out”, drinking extra fluids on your air breaks may help. Water is always available in the chamber. Crackers, coffee, soft drinks, juice, are provided on request during your second air break (about 70 minutes into the dive).

Medical Documentation: Photographs

During your treatments, medical photographs of your wound may be taken on a regular basis to document your progress and to be essential to facilitate our weekly medical planning and review meetings. You have our assurance that these photographs are only used for medical purposes, and that all of your personal medical information is maintained with your confidentiality in mind.

Safety Precautions

You are required to observe several safety precautions:

- a) No cigarettes, matches, lighters, or other ignition sources are permitted inside the chamber.
- b) Skin care products, hair sprays, and cosmetics containing alcohol or petroleum based materials may pose a hazard during treatment and should not be worn. They may be applied immediately after a treatment.
- c) No outside street clothing or shoes are permitted inside the treatment chamber. You will change into special clothing provided by our staff after you arrive for the day.
- d) Once in dive clothing, you must remain inside the building to prevent outside contaminants from entering the chamber environment.
- e) Please use the restroom prior to your treatment dive. Chamber toilet facilities are very limited.
- f) Watches (unless dive rated), partial dentures, contact lenses, hearing aids, wigs, and other prosthetic devices must be removed and stored in your locker (or our lock box) before treatment.
- g) Newspapers and pens are not permitted. Pencils, magazines, and books are acceptable. We have an assortment of reading materials available for your use during chamber treatments.

- h) If you are a gurney patient, please wait for a medical attendant before moving about.

Treatment Schedules

Except for mild carbon monoxide poisoning and uncomplicated decompression sickness, most diagnoses require between 20 and 40 treatment dives to gain the maximum benefit from HBO. Your primary referring physician in consultation with our hyperbaric physician will determine the best treatment plan for your specific problem. Although the healing process begins with the first dive, you may not see any obvious changes for up to three weeks!! Also, since routine treatment dives are scheduled for Monday through Friday, it actually takes two weeks time for every 10 dives planned! Each dive takes approximately 2-1/2 hours, plus changing time, and wound care if needed. While this represents a significant investment of your time, the alternatives are often less desirable. If you must miss a treatment dive due to an unavoidable conflict, it is best to schedule that activity on a Tuesday, Wednesday, or Thursday. Sometimes a three-day period with no treatment dive is unavoidable, however a little advanced planning can frequently prevent that. If you must miss a treatment because of an emergency, please call us at (210) 536-3281 and let us know as soon as possible.

Who Is Eligible For Treatment at Brooks

The treatment facility at Brooks AFB operates on a referral only basis. That means your Primary Care Manager (PCM) or other specialty physician must contact one of our physicians to discuss your case and arrange for an evaluation consult. Evaluations usually begin at 0830 – 0900 and may take one to two-and-one-half hours, depending on the complexity of your case. We are authorized to care for: military members and their dependents; retirees and their dependents if still in the military system; and selected referrals from the Veterans Health Care system (Audie Murphy VA). Since there are several excellent civilian hyperbaric facilities in the San Antonio area, we are not able to care for the general civilian population unless there is a severe medical emergency that cannot be handled by any other available facility.

Medical Records

On your first evaluation visit at Brooks, you should bring: your full outpatient medical records; any recent history and physical forms and discharge summaries from recent hospitalizations; the results of any recent chest x-rays; and your outpatient medical records. Ensure that you bring a complete listing of all of your current medications, and bring your consultation request form as filled out by your primary/referring physician. If you are an inpatient, your

hospital records should accompany you every day. If you are an outpatient, we will maintain your records here, unless you need them on a specific day for another medical appointment.

Visitors

Regrettably, we do not have the space needed to comfortably accommodate a large amount of visitors. If you would like to bring a visitor or two to see our facility, please coordinate that ahead of time with our staff. We are proud of our organization and enjoy showing it off in its best light. Small groups and tours are handled by appointment.

Questions

Our staff are highly trained and eager to make your treatment as pleasant and effective as possible. Do not hesitate to ask any of our staff if you have a question or a problem regarding your treatment plan. Additional information about our operations may be found on our internet web site at:

<http://wwwsam.brooks.af.mil/hyper/>
Our phone number is (210) 536-3281.